

Title: Invariants of manifolds from 6 dimensions.

Abstract: Physics predicts existence of "6-dimensional superconformal field theories" (6d SCFTs). They naturally provide a universal point of view on differential invariants of 3- and 4-manifolds. Moreover, this point of view leads to various conjectures on the known gauge-theoretic invariants (e.g. Vafa-Witten invariants of 4-manifolds and their generalizations; Witten-Reshetikhin-Turaev invariants of 3-manifolds), as well as prediction of certain new invariants. Some of the new invariants can be understood as categorification of the old ones. The aim of my lectures is to review developments in this approach, focusing on the mathematical side of the story and some concrete examples.